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Date Out EFB: MAY 13 1980

To: Product Manager (25) Taylor
TS-767

Through: Dr. Gunter Zweig, Chief
Environmental Fate Branch

From: Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 464 LLU

Chemical: Triclopyr (3,5,6 Trichloro - 2 - pyridinyloxyacetic acid), butoxy
ethyl ester

Type Product: Herbicide

Product Name: Garlon 4 Herbicide

Company Name: Dow

Submission Purpose: New Registration = forest site preparation,
industrial storage sites, rights-of-way, ditch
banks, etc.

ZBB Code: Section 3

EFB #330

Date in: 12-3-79

Action Code Type 11

Date Completed MAY 13 1980

Deferrals To:

☐ Ecological Effects Branch

☐ Residue Chemistry Branch

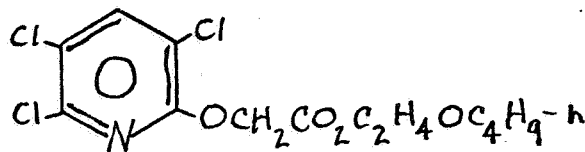
☐ Toxicology Branch

1. Introduction

Chemical Name and Type Pesticide: Triclopyr (3,5,6-trichloro-2-pyridinyloxyacetic), butoxy ethyl ester, 61.6% a.i., herbicide.

Trade Name: GARLON 4 Herbicide.

Chemical Structure:



Physical Properties

Molecular formula: C₁₃H₁₆Cl₃NO₄

Molecular weight: 356.69 gm/mole

Appearance: Clear oil

Odor: Slight

Vapor pressure: 1x10⁻⁵ mm Hg at 33°C

Solubility in H₂O: 0.023 mg/ml at 22°C

Octanol/Water ratio = 1.23 x 10⁴

This is a request for a new registration of GARLON 4 Herbicide (4 lb/gal triclopyr) to be used for the control of unwanted woody plants and weeds on non-crop areas including manufacturing and storage sites, rights-of-way, such as electrical power lines, communication lines, pipelines, roadsides and railroads, fence lawns, around farm buildings and outer banks of ditches.

2. Directions for Use

FOLIAR APPLICATIONS:

Use GARLON 4 Herbicide at rates of 1 to 8 quarts per acre to control broadleaf weeds and woody plants. In all cases use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. The recommended order of addition to the spray tank is water, Nalco-Trol¹ (If used), surfactant (if used), additional herbicide (if used), GARLON 4 Herbicide. If combined with TORDON* 101 Mixture Herbicide, continuous moderate agitation is required. If surfactant is used, add 1 to 2 quarts per acre of a standard agricultural surfactant such as Tronic, Sponto 712 or Ortho X-77. Use continuous mild agitation.

Consult the table to determine which method of application is suggested for a particular use.

Before using any recommended tank mixtures, read the directions and all precautions on both labels.

For best results applications should be made when woody plants and weeds are actively growing. When hard-to-control species such as ash, blackgum, choke cherry, elm, maples (other than vine or big leaf), oaks, pines, or winged elm are prevalent and during applications made during late summer when the plants are mature, or during drought conditions, use the higher rates of GARLON 4 Herbicide alone or in combination with TORDON* 101 Mixture.

When using GARLON 4 in combination with ESTERON 99 Concentrate Herbicide, generally the higher rates should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard-to-control species, resprouting may occur the year following treatment.

Additional directions are given for High-Volume and Low-Volume Sprays With Ground Equipment, Woody Plant Control, Broadleaf Weed Control, Aerial Application, and Basal Bark and Dormant Brush Treatments.

Use Precautions

Do not apply directly to, or allow it to come in contact with, grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants and do not permit spray mists containing it to drift onto them.

3. Discussion of Data

The reviewer was referred to EPA Accession Nos. 229781 and 229782 for the following information on triclopyr:

- a. Basic soil metabolism, aerobic
- b. Soil metabolism, anaerobic
- c. Leaching studies - laboratory
- d. Hydrolysis
- e. Fish residue
- f. Photodegradation, aqueous
- g. Effects on microorganisms
- h. Effect of microorganisms on triclopyr

Two studies were submitted with the application and are reviewed below.

Hydrolysis

The Hydrolysis of Triclopyr EB Ester in Buffered Deionized Water, Natural Water, and Selected Soils, H.D. Bidlack, May 3, 1978, Tab D.2, Vol. II, Acc. # 241362.

Experimental Procedure

The Hydrolysis of this 2,6-¹⁴C-ring labeled ester was studied in phosphate buffered sterile deionized water at pH 5, 7, and 9 and temperatures of 15°, 25°, and 35°C in the dark. Studies in soils from Geneseo, IL (pH 5.4), Wayside, MS (pH 6.1), and Midland, MI (pH 6.8) were treated at the rate of 1 kg per 6 cm hectare. Studies in natural water used non-sterile, unfiltered water from Black Creek in MI. Ester concentration was at 1 ppm, generally; one experiment tested 1 ppm to determine concentration dependence. Analysis was by TLC.

Result

As can be seen from Table 1, hydrolysis is fairly rapid at environmental pH (7.0) and temperatures (T 1/2 = 8.7 days at 25°C and T 1/2 = 2.3 days at 35°C). The half-life in natural water from a creek was 12 hours at pH 6.7. T 1/2 = 3 hours for the three soils studied. Triclopyr was the only hydrolysis product detected in all the studies.

TABLE 1. HALF-LIFE HYDROLYSIS RATE CONSTANT OF 1 PPM TRICLOPYR EB ESTER IN PHOSPHATE BUFFERED WATER AND IN NATURAL WATER

pH	Temp °C	Half-Life Days
5	15	208.8
	25	84.0
	35	25.9
7	15	25.5
	25	8.7
	35	2.3
9	15	1.7
	25	0.3
	35	0.06
6.7 ^{c/}	25	0.5

^{c/} Natural water; hydrolyzed at 24°C only.

Conclusions

Triclopyr EB ester, the active ingredient in GARLON 4 Herbicide, hydrolyzes fairly rapidly (2.3 to 8.7 days) in buffered water at environmental temperature and pH.

Field Dissipation

Determination of Residues of Triclopyr and 3,5,6-Trichloro-2-pyridinol in Soil Following Ground Application of GARLON 4 Herbicide, W. J. Woods and R. L. McKellar, October 15, 1979, Tab D.3, Vol. II, Acc. # 241362.

Experimental Procedure

GARLON 4 Herbicide was applied to experimental plots in Oregon (silty clay soil) and New York (silt loam) at the rate of 2 gal/A (8 lb triclopyr/A). Soil samples were taken from 0-6, 6-12, and 12-18" depths at intervals (0, 7, 14, 28, 56, 117, and 361 days) up to 365 days and analyzed for triclopyr and 3,5,6-trichloro-2-pyridinol by gas chromatography.

Results

Triclopyr residues in the 0-6" Oregon soil were 1.2 ppm (mean) on 0-day and fell to 0.23 ppm on 112 days. Residues of triclopyr for corresponding New York samples fell from 2.9 ppm to 0.20 ppm after 117 days. Residues in the 6-12" and 12-18" samples were not detectable after 117 days.

Residues of 3,5,6-Trichloro-2-pyridinol were mainly in the 0-6" depth and increased from below 0.05 ppm to maximum of 0.21 ppm in Oregon (112 days) and 0.36 ppm in New York (56 days). Residues fell to below 0.05 ppm at end of year.

Conclusions

After 117 days, there were no detectable residues of triclopyr or 3,5,6-trichloro-2-pyridinol in the 6-18" samples of both New York and Oregon soils.

4. Conclusions and Executive Summary

Triclopyr EB ester is hydrolyzed fairly rapidly and is not detected in soil at the 6-18 inch level after 117 days.

5. Recommendations

EFB concurs with the proposed use and registration of GARLON 4 Herbicide since:

- a. Its environmental fate is known.
- b. There is another product now registered (GARLON 3A) that differs from GARLON 4 in having 3 lb/gal of triclopyr instead 4 lb/gal.
- c. The herbicide is for non-crop use, as is GARLON 3A, and should cause no incremental risk.

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